REMARKS

The Office Action dated February 23, 200i7 has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto.

Claims 1, 6, 7, 13, 16-19, 21-28, 31, 36, 37, 39, and 43 have been amended to more particularly point out and distinctly claim the subject matter of the invention. New claim 46-49 have been added. Claims 5, 20, and 35 have been canceled without prejudice or disclaimer. No new matter has been added. Support for the claim amendments and new claims ay be found at least in paragraphs 0074, 0080, 0086, and 0101 of the specification and in the originally filed claims. Therefore, claims 1-4, 6-19, 21-34, and 36-49 are currently pending in the application and are respectfully submitted for consideration.

The Office Action rejected claims 1-2, 4-17, 19-32, and 34-45 under 35 U.S.C. §102(e) as being anticipated by Ketchum (U.S. Patent Pub. No. 2003/0048856). The rejection is respectfully traversed for the following reasons.

Claim 1, upon which claims 2-4, 6-15, and 47 are dependent, recites a method which includes determining a performance measure characterizing performance of a communication channel between a first transceiver and a second transceiver in a telecommunication system by using an extended channel model which depends on a non-orthogonal modulation matrix, the communication channel including non-orthogonal

modulation by the non-orthogonal modulation matrix. The modulation symbols are distributed using at least two radiation patterns and the performance measure is sensitive to the modulation. The method also includes controlling the communication resources based on the performance measure.

Claim 16, upon which claims 17-19, 21-30, and 48 are dependent, recites an arrangement including a determining unit configured to determine a performance measure characterizing performance of a communication channel between a first transceiver and a second transceiver in a telecommunications system by using an extended channel model which depends on a non-orthogonal modulation matrix, the communication channel including non-orthogonal modulation by the non-orthogonal modulation matrix. The modulation symbols are distributed using at least two radiation patterns and the performance measure is sensitive to the modulation. The arrangement further includes a controlling unit configured to control the communication resources based on the performance measure.

Claim 31, upon which claims 32-34, 36-45, and 49 are dependent, recites a controller of a telecommunications system. The controller includes a performance measure estimator configured to determine a performance measure that characterizes performance of a communication channel between a first transceiver and a second transceiver by using an extended channel model which depends on a non-orthogonal modulation matrix. The communication channel including non-orthogonal modulation by the non-orthogonal modulation matrix, modulation symbols are distributed using at

least two radiation patterns, and the performance measure is sensitive to the modulation. The controller further includes a control unit connected to the performance measurement unit, the control unit being configured to control the communication resources based on the performance measure.

Embodiments of the invention provide several advantages over conventional controlling based purely on the radio channel characterization. Examples of the invention provide an improved communication channel characterization, which accounts for the effect of spatial modulation on the communication channel and, in particular, in the presence of non-orthogonal modulation. The inventive communication channel characterization enables the communication resources to be controlled such that contribution of various aspects of the transmission and reception chain on the communication channel may be accounted for when controlling the communication resources. The performance measure of the invention enables the transceivers to compare relative efficiencies of a number of alternative transmission methods, and thus to be able to select a desired transmission method. Other advantageous results may also be achieved by the present invention.

As will be discussed below, Ketchum fails to disclose or suggest all of the elements of the claims, and therefore fails to provide the advantages and features discussed above.

Ketchum discloses a method and apparatus for processing data for transmission in a multi-channel communication system using selective channel inversion. The data

processing includes coding data based on a common coding and modulation scheme to provide modulation symbols and pre-weighting the modulation symbols for each selected channel based on the channel's characteristics. The pre-weighting may be achieved by inverting the selected channels so that the received SNRs are approximately similar for all selected channels. With selective channel inversion, only channels having SNRs at or above a particular threshold are selected, bad channels are not used, and the total available transmit power is distributed across only good channels.

Applicants respectfully submit that Ketchum fails to disclose or suggest all of the elements of the present claims. For example, Ketchum does not disclose or suggest "determining a performance measure characterizing performance of a communication channel between a first transceiver and a second transceiver in a telecommunication system by using an extended channel model which depends on a non-orthogonal modulation matrix, the communication channel including non-orthogonal modulation by the non-orthogonal modulation matrix," as recited in claim 1 and similarly recited in claims 16 and 46. Ketchum also fails to disclose or suggest "a performance measure estimator configured to determine a performance measure that characterizes performance of a communication channel between a first transceiver and a second transceiver by using an extended channel model which depends on a non-orthogonal modulation matrix, the communication channel including non-orthogonal modulation by the non-orthogonal modulation matrix," as recited in claim 31.

As discussed above, Ketchum discloses a method and apparatus for processing data for transmission in a wireless communication system using selective channel inversion. Channel state information (CSI) descriptive of the link conditions may be determined at the receiver system and provided to the transmitter system to utilize the capacity of the transmission channels. The transmitter system may then encode, modulate, and/or pre-weight data such that the transmitted information bit rate for each channel matches the transmission capacity of the channel. The CSI may include characterization of the amplitude and phase across the entire system bandwidth for the propagation path between each transmit-receive antenna pair in a MIMO matrix, or SNRs of the transmission channels (Ketchum, paragraph 0026).

With reference to Figure 3 of Ketchum, the received SNR determined by RX channel/data processor 356 is provided to a TX data processor 362, which processes the CSI and provides processed data to one or more modulators 354. Modulators 354 further condition the processed data and transmit the CSI back to transmitter system 310 via a reverse channel (Ketchum, paragraph 0171). At system 310, the transmitted feedback signal is provided to a RX data processor 332. RX data processor 332 performs processing complementary to that performed by TX data processor 362 and recovers the reported CSI, which is then provided to controller 334 (Ketchum, paragraph 0172).

The controller 334 uses the reported CSI to perform a number of functions including: selecting the set of N_S best available transmission channels for data transmission; determining the coding and modulation scheme to be used for data transmission on the

selected transmission channels; and determining the weights to be used for the selected transmission channels. The Controller 334 may select the transmission channels to achieve high throughput or based on some other performance criteria or metrics, and may further determine the threshold used to select the transmission channels, as described above (Ketchum, paragraph 0173).

The purpose of Ketchum, therefore, is to generate CSI in the receiver on the received signal and signal the CSI to the transmitter. The transmitter uses CSI to determine the coding and modulation scheme to be used for data transmission.

Ketchum, however, fails to disclose that the communication channel includes non-orthogonal modulation by non-orthogonal modulation matrix and the use of extended channel model which depends on the non-orthogonal modulation matrix in the determination of the performance measure. Ketchum also fails to disclose including the modulation into the channel model. Therefore, Ketchum's teachings would not be applicable for determining the performance measure so that the performance measure depends on the non-orthogonal modulation. Furthermore, Ketchum fails to disclose matrix modulation. Rather, Ketchum discloses scalar modulation.

Thus, for at least the reasons discussed above, Ketchum fails to disclose or suggest "determining a performance measure characterizing performance of a communication channel between a first transceiver and a second transceiver in a telecommunication system by using an extended channel model which depends on a non-orthogonal modulation matrix, the communication channel including non-orthogonal modulation by

the non-orthogonal modulation matrix," as recited in claim 1 and similarly recited in claims 16 and 46, or "a performance measure estimator configured to determine a performance measure that characterizes performance of a communication channel between a first transceiver and a second transceiver by using an extended channel model which depends on a non-orthogonal modulation matrix, the communication channel including non-orthogonal modulation by the non-orthogonal modulation matrix," as recited in claim 31. As such, Applicants respectfully request that the rejection of claims 1, 16, and 31 be withdrawn.

Claims 2-4, 6-15, 17-19, 21-30, 32-34, 36-45, and 47-49 are dependent upon claims 1, 16, and 31, respectively. Accordingly, claims 2-4, 6-15, 17-19, 21-30, 32-34, 36-45, and 47-49 should be allowed for at least their dependence upon claims 1, 16, and 31, and for the specific limitations recited therein.

Claims 3, 18, and 33 were rejected under 35 U.S.C. §103(a) as being unpatentable over Ketchum in view of Cheng (U.S. Patent No. 6,411,817). The Office Action took the position that Ketchum discloses all of the elements of the claims, with the exception of "determining a second performance measure for a second communication channel between the first transceiver and a third transceiver; and controlling the communication resources based on the determined performance measures." The Office Action then cited Cheng as allegedly curing this deficiency in Ketchum. This rejection is respectfully traversed for the following reasons.

Ketchum is discussed above. Cheng discloses a method for controlling downlink power in a time-division multiplex wireless system which may provide different downlink transmit signal powers to different time-division multiplex channels of a single carrier. A base station receives a measured signal parameter data for a downlink transmit signal of a time-division multiplex channel. The base station determines an initial adjustment for the downlink transmit signal power of the time division multiplex channel if the measured signal parameter data differs from a target signal parameter data. The base station determines a revised adjustment for the downlink transmit power of the time division multiplex channel based on the initial adjustment and at least one adjustment range as appropriate to achieve synchronization of the demodulation of the downlink transmit signal.

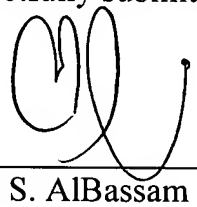
Claims 3, 18, and 33 are dependent upon claims 1, 16, and 31, respectively. As discussed above, Ketchum does not disclose or suggest all of the elements of claims 1, 16, and 31. Additionally, Cheng does not cure the deficiencies in Ketchum with respect to claims 1, 16, and 31, as Cheng also fails to disclose or suggest that the communication channel includes non-orthogonal modulation by non-orthogonal modulation matrix and the use of extended channel model which depends on the non-orthogonal modulation matrix in the determination of the performance measure. Therefore, the combination of Ketchum and Cheng does not disclose or suggest all of the elements of claims 3, 18, and 33. Furthermore, claims 3, 18, and 33 should be allowed for at least their dependence upon claims 1, 16, and 31, and for the specific limitations recited therein.

Applicants respectfully submit that Ketchum and Cheng, whether viewed individually or combined, fail to disclose or suggest all of the elements of the claimed invention. These distinctions are more than sufficient to render the claimed invention unanticipated and unobvious. It is therefore respectfully requested that all of claims 1-4, 6-19, 21-34, and 36-49 be allowed, and this application passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the applicant's undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,



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